Voice software helps study of rare Yosemite owls

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In this July 2012 photo released by the National Park Service, two juvenile Great Gray Owls are shown on a tree branch in Yosemite National Park. The unique Great Gray Owls of Yosemite National Park, left to evolve after glacial ice separated them from their plentiful Canadian brethren 30 millennia ago, are both a mystery and concern to the scientists charged with protecting them. (AP Photo/National Park Service)

In the bird world, they make endangered condors seem almost commonplace. The unique Great Gray Owls of Yosemite, left to evolve

after glacial ice separated them from their plentiful Canadian brethren 30 millennia ago, are both a mystery and concern to the scientists charged with protecting them.

With fewer than 200 in existence in this small pocket of the Sierra Nevada, the slightest disturbances by humans can drive the extremely shy birds from their nests, disrupting sporadic mating cycles that ebb and flow annually depending upon food availability.

So this summer, researchers found a way to abandon their traditional heavy-handed trapping, banding and the blasting of owl calls in favor of the kind of discrete, sophisticated technology used by spies and forensic scientists.

They hope to lessen human influence on this subspecies of owls prized for the potential insights their survival offers into habitat-specific evolution.

"Even if it takes only 15 minutes to trap a bird, it's traumatic for them in the long term," said Joe Medley, a PhD candidate in ecology at the University of California, Davis who perfected computer voice recognition software to track the largest of North America's owls. "With a population this small, we want to err on the side of caution in terms of the methods we use to get data."

Medley placed 40 data-compression digital audio recorders around the mid-elevation meadows typically favored by the owl known as Strix nebulosa Yosemitensis, hoping to identify them by their mating, feeding and territorial calls.

He ended up with 50 terabytes of owl calls mixed with airplanes flying overhead, frogs croaking, coyotes yipping, bears growling and even the occasional crunch of fangs on pricy microphones—so much data it

would have taken seven years to play back.

He then designed algorithms for an existing computer program that would search for the specific frequency and time intervals of the Great Gray Owls' low-pitched hoot "whooo-ooo-ooo-ooo." The program could discern males and females from juveniles, and even identify nesting females calling for food to help determine reproduction success. The results are still being analyzed.

"It's capable of searching a week's worth of data in an hour. What I was left with was owls and a host of other things that fell in the same bandwidth," Medley said.

Most of the world's Great Gray Owls make their homes in northern hemisphere boreal forests, though a few live as far south as Oregon and Idaho. The giants with piercing yellow eyes and 5-foot (1.5-meter) wingspans have adapted so well to snow that they can dive face-first through up to a foot (30 centimeters) of it to catch the voles they hear creeping underneath. Their dish-shaped faces work to amplify sound.

During the last ice age 30,000 years ago, a small population in and around what would become the glacially carved landscape of Yosemite was cut off from the others to evolve on their own in a warmer, less snowy climate.

Those owls, now numbering just a couple of hundred, are on California's endangered species list. The giant condors, once nearly extinct, number around 400 in California and the Southwest, and are on the federal endangered list.

"These (owls) exist nowhere else in the world, and where they do occur is a pretty amazing location," said Joshua Hull, a researcher with the U.S. Fish and Wildlife Service and adjunct professor at UC Davis. "These are

going in a different evolutionary direction than the others, and we don't know where that is right now."

Scientists from Yosemite, the U.S. Forest Service and Fish and Wildlife, with funding from the Yosemite Conservancy, are working to gain a greater understanding of what those differences mean. So far, DNA studies have noted distinct genetic variations between the separated groups in addition to the different food sources and nesting patterns the southern birds have adapted. The birds have very subtle differences in color.

"That's important to know because if it's genetically different, we should try to keep it that way," Hull said. "You wouldn't want to bring in individuals from Oregon to supplement a unique population."

The major threats to their continued survival are the mosquito-borne West Nile Virus—and humans. A female believed to be the cohort's most reliable breeder was struck and killed by a car in the park in August, prompting slower speed limit warnings to protect the low-flying raptors that rarely lift more than 20 feet (six meters) above ground.

Because of their rarity, they are highly sought out by birdwatchers whose presence in meadows can deter mating and food foraging, the researchers say. That's why no one will reveal exactly where in the park they are.

"They will abandon their nests if disturbed," said Steve Thompson, Yosemite's branch chief of wildlife management. "It's an extremely low population very vulnerable to natural- and human-caused events. They don't have the ability to rebound the way more abundant species do. We're very protective of them."

So protective that the owls will no longer be trapped to draw blood for

studies. Instead researchers are collecting molted feathers to extract and amplify DNA to track lineage, mating patterns, population size, survival rates and even genetic mutations that might occur as the climate changes yet again.

"Genetic mutations occur randomly. It's just chance whether those mutations are advantageous or deleterious to the population," Thompson said. "And all of this is happening over tens of thousands of years, so to me as a biologist it's really exciting to have this demonstration of how evolution occurs."